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EXAMINER

KHOSHNOODI, FARIBORZ

ART UNIT	PAPER NUMBER
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2168

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/30/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No. 10/532,372	Applicant(s) TAMATSU, MASA HARU	
	Examiner Fariborz Khoshnoodi	Art Unit 2168	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 April 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

Detailed Action

Claim Rejections - 35 USC § 101

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

1. Claims 1, 4, 6, 8, and 11-12 (and their dependent claims, where applicable) are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

2. Claims 1, 4, 6, 8, and 11-12 (and their dependent claims, where applicable) are non-statutory because it fails to be claimed in conjunction with a computer readable medium. The components claimed, (i.e., ***DATABASE ACCELERATOR***) is interpreted as being implemented by software. Software per se, does not fall within a statutory category of patentability.

Appropriate correction required.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office Action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-2 and 4-7 rejected under 35 U.S.C. § 102(b) as being anticipated by Lin M.

Huei United States Patent No. 5,544,357.

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As per claim 1:

Huei teaches a method/system, comprising: **a primary system that holds data records having data items including primary keys, primary blocks that store the data records in the order of their primary keys, and a location table that contains in a contiguous region location table entries containing the addresses of the primary blocks** (i.e., "Host database software 114 manages key memory 124, for instance apportioning key memory 124 among multiple logical keys. For instance, if key memory 124 has 4096 entries and database file 110 has three keys typically a primary and two secondary keys), host database software 114 may decide to store the primary key in entries 0 through 1365, the secondary keys in entries 1366 through 2730, and tertiary keys in entries 2731 through 4095." (Col. 4 lines 41-47)); **and an accelerator system that holds a frond location table that contains in a contiguous region frond location table entries containing the addresses of the primary blocks** (i.e., "The entries in key memory 124 are managed as required by the search strategy implemented by the search circuits of database accelerator 120. For instance, if database accelerator 120 uses a binary search, then the entries in key memory must stored in sorted order with no gaps within the range allocated to a logical key." (Col. 4 lines 52-57)).

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As per claim 2:

Huei teaches a method/system, **additionally comprising: the primary system equipped with at least one CPU** (*i.e.*, "CPU 102 runs database management software 114 and application software 116 stored in RAM 104." (Col. 3 lines 1-3)); **and the accelerator system equipped with at least one CPU** (*i.e.*, "personal computer 100 has a central processor unit (CPU) 102" (Col. 2 lines 64-65)).

As per claim 4:

Huei teaches a method/system comprising: **a primary system that holds data records having data items including primary keys, primary blocks that store the data records in the order of their primary keys, a location table that contains in a contiguous region location table entries containing the addresses of the primary blocks, and a modification information transmission mechanism** (*i.e.*, "Host database software 114 manages key memory 124, for instance apportioning key memory 124 among multiple logical keys. For instance, if key memory 124 has 4096 entries and database file 110 has three keys typically a primary and two secondary keys), host database software 114 may decide to store the primary key in entries 0 through 1365, the secondary keys in entries 1366 through 2730, and tertiary keys in entries 2731 through 4095." (Col. 4 lines 41-47))... "The modified binary search finds the first entry in the memory

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matching a given value."(Col.2 lines 16-18)); and an accelerator system that holds a frond location table that contains in a contiguous region frond location table entries containing the addresses of the primary blocks and a modification information application mechanism. (i.e., "The entries in key memory 124 are managed as required by the search strategy implemented by the search circuits of database accelerator 120. For instance, if database accelerator 120 uses a binary search, then the entries in key memory must stored in sorted order with no gaps within the range allocated to a logical key."(Col. 4 lines 52-57)..."The modified binary search finds the first entry in the memory matching a given value."(Col.2 lines 16-18)).

As per claim 5:

Huei teaches a method/system, **the primary system equipped with at least one CPU** (i.e., "CPU 102 runs database management software 114 and application software 116 stored in RAM 104."(Col. 3 lines 1-3)); **and the accelerator system equipped with at least one CPU** (i.e., "personal computer 100 has a central processor unit (CPU) 102"(Col. 2 lines 64-65)).

As per claim 6:

Huei teaches a method/system comprising: **a primary system that holds data records having data elements including primary keys, primary blocks that store the data records in the order of their primary keys, and a location table that contains in a contiguous region location table entries containing the addresses of the primary blocks** (*i.e.*, "Host database software 114 manages key memory 124, for instance apportioning key memory 124 among multiple logical keys. For instance, if key memory 124 has 4096 entries and database file 110 has three keys typically a primary and two secondary keys), host database software 114 may decide to store the primary key in entries 0 through 1365, the secondary keys in entries 1366 through 2730, and tertiary keys in entries 2731 through 4095." (Col. 4 lines 41-47)); **an accelerator system that holds a frond location table that contains in a contiguous region frond location table entries containing the addresses of the primary blocks** (*i.e.*, "The entries in key memory 124 are managed as required by the search strategy implemented by the search circuits of database accelerator 120. For instance, if database accelerator 120 uses a binary search, then the entries in key memory must stored in sorted order with no gaps within the range allocated to a logical key." (Col. 4 lines 52-57)); **and means of accelerator system access by primary key that performs a binary search on the frond location table and accesses blocks on the primary system based on results indicated by frond location table entries** (*i.e.*, Referring now to FIGS. 3 and 4, the

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SEARCH command uses a binary search to locate the first key value in a selected range of key memory corresponding to an encoded key value, and thus the entries of key memory 124 are stored sorted in ascending order by encoded key value 202.
"(Col. 4 lines 66-67 and Col. 5 lines 1-3)).

As per claim 7:

Huei teaches a method/system, **the primary system equipped with at least one CPU** (i.e., "CPU 102 runs database management software 114 and application software 116 stored in RAM 104." (Col. 3 lines 1-3)); **and the accelerator system equipped with at least one CPU** (i.e., "personal computer 100 has a central processor unit (CPU) 102" (Col. 2 lines 64-65)).

5. Claims 8 and 11-12 rejected under 35 U.S.C. § 102(b) as being anticipated by Masaharu Tamatsu United States Patent Publication No. 2001/0011321 A1.

As per claim 8:

Tamatsu teaches a method/system comprising: **a primary system that holds data having data items including primary keys and alternate keys, primary blocks that store the data records in the order of their primary keys, alternate-key entries made up of alternate keys and primary keys, alternate-key blocks that include alternate-key entries, and an**

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alternate-key location table that contains in a contiguous region alternate-key location table entries (i.e., "Next, we describe storage and updating with alternate keys. Alternate-key tables are stored in an alternate-key block in the order of their alternate keys. Entries in an alternate-key table consist of an alternate key, the physical address of the block where the record of that key value is stored, and the primary key of the record of that key value. The number of entries in an alternate-key table changes when its records are added or updated, but there is a high possibility that an increase in the number of entries will result in entry insertion and a very low possibility that such increase will result in entry addition. Therefore, the management methods used for primary keys are not appropriate." (Par. 43 lines 1-12));

and an accelerator system that holds a frond alternate-key location table that contains in a contiguous region frond alternate-key location table entries (i.e., "Next, the location tables and alternate-key block are to be prepared. The number of location table entries is obtained by dividing the number of records planned to be stored by the number of records that can be stored in a single block, and that amount of space is secured in a contiguous region." (Par. 53 lines 1-6)).

As per claim 11:

Tamatsu teaches a method/system comprising: **a primary system that holds data having data items including primary keys and alternate keys, primary blocks that store the data records in the order of their primary keys, alternate-key entries made up of alternate keys and primary keys, alternate-key blocks that include alternate-key entries, and an alternate-key location table that contains in a contiguous region alternate-key location table entries** (*i.e.*, "Next, we describe storage and updating with alternate keys. Alternate-key tables are stored in an alternate-key block in the order of their alternate keys. Entries in an alternate-key table consist of an alternate key, the physical address of the block where the record of that key value is stored, and the primary key of the record of that key value. The number of entries in an alternate-key table changes when its records are added or updated, but there is a high possibility that an increase in the number of entries will result in entry insertion and a very low possibility that such increase will result in entry addition. Therefore, the management methods used for primary keys are not appropriate." (Par. 43 lines 1-12)); **and an accelerator system that holds a frond alternate-key location table that contains in a contiguous region frond alternate-key location table entries and a modification information application mechanism** (*i.e.*, "Next, the location tables and alternate-key block are to be prepared. The number of location table entries is obtained by dividing the number of

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records planned to be stored by the number of records that can be stored in a single block, and that amount of space is secured in a contiguous region."(Par. 53 lines 1-6)... *"When a record is accessed and a record's key is modified when an index is updated, the index is also modified"*(Par. 8 lines 6-8)).

As per claim 12:

Tamatsu teaches a method/system comprising a primary system that holds data having data elements including primary keys and alternate keys, primary blocks that store the data records in the order of their primary keys, alternate-key entries made up of alternate keys and primary keys, alternate-key blocks that include alternate-key entries, and an alternate-key location table that contains in a contiguous region alternate-key location table entries (*i.e.*, "Next, we describe storage and updating with alternate keys. Alternate-key tables are stored in an alternate-key block in the order of their alternate keys. Entries in an alternate-key table consist of an alternate key, the physical address of the block where the record of that key value is stored, and the primary key of the record of that key value. The number of entries in an alternate-key table changes when its records are added or updated, but there is a high possibility that an increase in the number of entries will result in entry insertion and a very low possibility that such increase will result in entry addition. Therefore, the management methods

used for primary keys are not appropriate." (Par. 43 lines 1-12)); an accelerator system that holds a alternate-key location table that contains in a contiguous region alternate-key location table entries (i.e., "Next, the location tables and alternate-key block are to be prepared. The number of location table entries is obtained by dividing the number of records planned to be stored by the number of records that can be stored in a single block, and that amount of space is secured in a contiguous region." (Par. 53 lines 1-6)... "When a record is accessed and a record's key is modified when an index is updated, the index is also modified" (Par. 8 lines 6-8)); and means of accelerator system access by alternate key that performs a binary search on the frond alternate-key location table and accesses alternate-key blocks on the primary system based on results indicated by frond alternate-key location table entries (i.e., "Next, we will describe retrieval using alternate keys. Retrieval with alternate keys is performed by searching alternate-key blocks. The binary search method is typically used, but the discussion is omitted here since it is described above with respect to retrieval using primary keys." (Par. 49 lines 1-5)).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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- (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huei United States Patent No. 5,544,357 in view of Levy et al. United States Patent Publication No. 2003/0158842 A1.

As per claim 3:

Huei does not explicitly disclose for the sharing multiple CPU. However, Levy et al teach a system/method, **the primary system and the accelerator system sharing multiple CPUs** (*i.e.*, "In some embodiments of the invention, the base verticals in the memory unit 210 of the EM 204 are shared by all of CPUs 205 of the EM," (Par. 109 lines 9-12)).

Therefore, it would have been obvious to a person in the art at the time the invention was made to modify the method disclosed in Huei to have the sharing multiple CPU. This modification would have been obvious because a person having ordinary skill in the art, at the time the invention was made, having the teachings of Huei and Levy et al. before him/her, to modify the method of Huei to include the sharing multiple CPU of Levy et al., since it is suggested by Levy et al. such that, it reduces the processing time required for query operation (*i.e.*, "During processing of a database command, the database loads into its CPU the rows of a vertical rather than rows of the entire table. By separating the tables into smaller groups

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of columns, the processing time required for queries which relate to fewer than all the columns of a table is reduced."(Par 45 lines 5-10)).

8. Claims 9 and 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tamatsu United States Patent Publication No. 2001/0011321 A1 in view of Levy et al. United States Patent Publication No. 2003/0158842 A1.

As per claim 9:

Tamatsu does not explicitly disclose for the CPU. However, Levy et al. teach a system/method, **the primary system equipped with at least one CPU** (*i.e.*, "During processing of a database command, the database loads into its CPU the rows of a vertical rather than rows of the entire table." (Par. 45 lines 5-8)); **and the accelerator system equipped with at least one CPU** (*i.e.*, "In the embodiment of FIG. 2, accelerator 110 comprises a plurality of execution machines (EMs) 204 that perform database instructions directed to accelerator 110. Each execution machine 204 optionally comprises one or more processors (CPUs) 205." (Par. 106 lines 2-7)).

Therefore, it would have been obvious to a person in the art at the time the invention was made to modify the method disclosed in Tamatsu to have the CPU. This modification would have been obvious because a person having ordinary skill in the art, at the time the invention was

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made, having the teachings of Tamatsu and Levy et al. before him/her, to modify the method of Tamatsu to include the CPU of Levy et al., since it is suggested by Levy et al. such that, it reduces the processing time required for query operation (*i.e.*, "By separating the tables into smaller groups of columns, the processing time required for queries which relate to fewer than all the columns of a table is reduced." (Par 45 lines 8-10)).

As per claim 10:

Tamatsu does not explicitly disclose for the sharing multiple CPU. However, Levy et al. teach a system/method, **the primary system and the accelerator system sharing multiple CPUs** (*i.e.*, "In some embodiments of the invention, the base verticals in the memory unit 210 of the EM 204 are shared by all of CPUs 205 of the EM," (Par. 109 lines 9-12)).

Therefore, it would have been obvious to a person in the art at the time the invention was made to modify the method disclosed in Tamatsu to have the sharing multiple CPU. This modification would have been obvious because a person having ordinary skill in the art, at the time the invention was made, having the teachings of Tamatsu and Levy et al. before him/her, to modify the method of Tamatsu to include the sharing multiple CPU of Levy et al., since it is suggested by Levy et al. such that, it reduces the processing time required for query operation (*i.e.*, "During processing of a database command, the database loads into its CPU the rows of a vertical rather than rows of the entire table. By separating the tables into smaller groups

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of columns, the processing time required for queries which relate to fewer than all the columns of a table is reduced."
(Par. 45 lines 5-10)).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fariborz Khoshnoodi whose telephone number is 571-270-1005. The examiner can normally be reached on M-Th every other F 8:00-4:00..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Vo can be reached on 571-272-3642. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Fariborz Khoshnoodi
Examiner
Art Unit 2168

FK

F.k.



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